

Application no. 09/166,343
Amdt. dated August 18, 2004
Reply to Office Action of May 19, 2004

Amendment to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 - 12 (canceled)

Claim 13 (currently amended): In a switching device, apparatus for communicating data packets from sending ports to destination ports, comprising:

a first stage queue comprising a plurality of first queues for storing packet-related data from a sending port, wherein the packet-related data is stored in the plurality of first queues based on a characteristic of the data packets;

a second stage queue associated with each of a set of destination ports, the second stage queue comprising a plurality of second queues, each of the plurality of second queues for storing the packet-related data from each of the plurality of first queues of the first stage queue based on a characteristic of the data packets; and

a switch fabric coupled to the second stage queue, the switch fabric using the packet-related data in the second stage queue for transmitting the data packets to a destination port.

Claim 14 (previously presented): The apparatus of claim 13 including means for determining from the packet-related data which destination ports are to receive the packet-related data in the first stage queue.

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Claim 15 (cancelled)

Claim 16 (previously presented): The apparatus of claim 13 including address resolution logic sending the packet-related data from the sending port to the first stage queue.

Claim 17 (cancelled)

Claim 18 (previously presented): The apparatus of claim 13 wherein each second stage queue includes multiple second queues, the packet-related data stored in a specific second queue based on the characteristic of the data packets.

Claim 19 (previously presented): The apparatus of claim 13 wherein the switch fabric is a shared memory switch fabric for communicating data packets from sending ports to destination ports.

Claim 20 (previously presented): The apparatus of claim 13 wherein the switch fabric is a crossbar matrix for communicating data packets from sending ports to destination ports.

Claim 21 (cancelled)

Claim 22 (previously presented): In a switching device, a method for communicating data packets from sending ports to destination ports, the method comprising:

- storing in a first stage queue a pointer to memory storing a data packet and a list of destination ports;
- identifying a destination port stored in the first stage queue;

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retrieving the pointer to memory stored in the first stage queue;

storing in a second stage queue associated with the identified destination port the retrieved pointer to memory; and

using the pointer to memory in the second stage queue to complete the communication of the data packet from the sending port to the identified destination port.

Claim 23 (previously presented): The method of claim 22, wherein the first stage queue includes multiple first queues, and the step of storing the pointer to memory in the first stage queue comprises storing the pointer in a specific first queue based on a characteristic of the packet.

Claim 24 (previously presented): The method of claim 22, wherein the second stage queue includes multiple second queues, and the step of storing the retrieved pointer to memory in the second stage queue comprises storing the retrieved pointer in a specific second queue based on a characteristic of the packet.

Claim 25 (previously presented): In a switching device, a method of communicating data packets from one or more sending ports to destination ports, the method comprising:

storing, in a first stage queue comprising a plurality of first queues, packet-related data associated with the data packets from the one or more sending ports, wherein the packet-related data are stored in one of the plurality of first queues based on a characteristic of the data packets;

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determining from the packet-related data which destination ports are to receive the packet-related data in the first stage queue;
storing in a second stage queue associated with each determined destination port the packet-related data from the first stage queue; and
transmitting the packet-related data in the second stage queue to a switch fabric for completing the communication of the data packet from the sending port to each determined destination port.

Claim 26 (previously presented): The method of claim 25 wherein the switch fabric is a shared-memory switch fabric, and the transmitting comprises using the packet-related data to obtain a copy of the data packets from the shared-memory switch fabric to complete communication of the data packet.

Claim 27 (previously presented): The method of claim 25 wherein the switch fabric is a crossbar matrix, and the transmitting comprises using the packet-related data to form connections in the matrix so as to communicate simultaneously a copy of the data packets from the sending port to each of the determined destination ports.

Claim 28 (previously presented): In a switching device, a method of communicating data packets from sending ports to destination ports, the method comprising:

storing in a first stage queue packet-related data from a sending port;

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determining from the packet-related data which destination ports are to receive the packet-related data in the first stage queue;

storing in a second stage queue associated with each determined destination port the packet-related data from the first stage queue based on network protocol type; and transmitting the packet-related data in the second stage queue to a switch fabric for completing the communication of the data packet from the sending port to each determined destination port.

Claim 29 (previously presented): In a switching device, a method of communicating data packets from sending ports to destination ports, the method comprising:

storing in a first stage queue packet-related data from a sending port;

determining from the packet-related data which destination ports are to receive the packet-related data in the first stage queue;

storing in a second stage queue associated with each determined destination port the packet-related data from the first stage queue based on whether the data packets are unicast packets or multicast packets; and

transmitting the packet-related data in the second stage queue to a switch fabric for completing the communication of the data packet from the sending port to each determined destination port.

Claim 30 (previously presented): In a switching device, a method of communicating data packets from sending ports to destination ports, the method comprising:

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storing in a first stage queue the data packets from a sending port;
determining from the data packets which destination ports are to receive the data packets in the first stage queue;
storing in a second stage queue associated with each determined destination port the data packets from the first stage queue based on a characteristic of the data packets;
and
transmitting the data packets in the second stage queue to a switch fabric for completing the communication of the data packet from the sending port to each determined destination port.

Claim 31 (previously presented): A multistage queuing apparatus for transmitting data packets from one or more sending ports to a plurality of destination ports, comprising:

a first queue structure, operatively coupled to the one or more sending ports, comprising a plurality of first queues for storing packet-related data associated with the data packets based on a first characteristic of the data packets; and

a second queue structure, operatively coupled to the first queue structure and plurality of destination ports, comprising a plurality of second queues for storing the packet-related data based on the first characteristic and a second characteristic.

Claim 32 (previously presented): The multistage queuing apparatus of claim 31, wherein the first characteristic is priority.

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Claim 33 (previously presented): The multistage queuing apparatus of claim 31, wherein the first characteristic is network protocol type.

Claim 34 (previously presented): The multistage queuing apparatus of claim 31, wherein the first characteristic is type of service.

Claim 35 (previously presented): The multistage queuing apparatus of claim 31, wherein the second characteristic is a destination port number associated with the plurality of destination ports.

Claim 36 (previously presented): A multistage queuing apparatus for transmitting data packets from one or more sending ports to a plurality of destination ports, comprising:

- a first queue structure, operatively coupled to the one or more sending ports, comprising a first array of two or more first queues for storing the packet-related data associated with the data packets in accordance with a first characteristic of the data packets; and

- a second queue structure comprising a plurality of second arrays, each of the second arrays comprising two or more second queues operatively coupled to one of the plurality of destination ports, wherein each of the second arrays is adapted to store the packet-related data from the first queue structure in accordance with the first characteristic.

Claim 37 (previously presented): The multistage queuing apparatus of claim 36, wherein the dimension of the first array

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is the same as the dimension of each of the plurality of second arrays.

Claim 38 (previously presented): The multistage queuing apparatus of claim 36, wherein the apparatus further includes port determination logic interposed between the first queue structure and second queue structure to determine to which of the plurality of destination ports to transmit the packet-related data.

Claim 39 (previously presented): In a switching device, a method of communicating data packets from sending ports to destination ports, the method comprising:

- storing in a first stage queue packet-related data from a sending port based on a characteristic of the data packets;
- determining from the packet-related data which destination ports are to receive the packet-related data in the first stage queue;
- storing in a second stage queue associated with each determined destination port the packet-related data from the first stage queue; and
- transmitting the packet-related data in the second stage queue to a switch fabric for completing the communication of the data packet from the sending port to each determined destination port.

Claim 40 (previously presented): The method of claim 39 wherein the packet-related data comprises a pointer to memory.

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Claim 41 (previously presented): The method of claim 39 wherein the packet-related data is a data packet.

Claim 42 (previously presented): The method of claim 39 wherein the first stage queue comprises a plurality of first queues, and the step of storing the packet-related data in the first stage queue comprises storing the packet-related data in one of the plurality of first queues based on the characteristic of each of the data packets.

Claim 43 (previously presented): The method of claim 39 wherein the packet characteristic is priority.

Claim 44 (previously presented): The method of claim 39 wherein the packet characteristic is network protocol type.

Claim 45 (previously presented): The method of claim 39 wherein the packet characteristic is type of service.

Claim 46 (previously presented): The method of claim 39 wherein the packet characteristic is packet type comprising a unicast type and multicast type.